

WHAT IS CLAIMED IS:

- 1 1. A method for forming a three-dimensional polymeric
2 structure, the method comprising:
3 providing at least one paint layer and a bonding layer coupled
4 to the at least one paint layer and including a first exterior surface;
5 extruding a structural sheet of at least one polymeric material
6 at an extrusion temperature, the sheet having a thickness at least 0.25
7 inches and a second exterior surface;
8 joining the first exterior surface to the second exterior
9 surface to form a thermoformable sheet;
10 forcing the thermoformable sheet against a three-dimensional
11 mold while the sheet is at a thermoformable temperature to deform the
12 sheet into a three-dimensional structure; and
13 removing the three-dimensional structure from the mold.
- 1 2. The method of claim 1, wherein the first exterior surface and
2 the second exterior surface are joined to one another after the structural
3 sheet has undergone at least 40 percent shrinkage from its extruded
4 dimension while cooling from the extrusion temperature.
- 1 3. The method of claim 2, wherein the thermoformable sheet is
2 joined to the laminate after the sheet has shrunk at least 90 percent from
3 its extruded dimensions.
- 1 4. The method of claim 1, wherein at least portions of the first
2 exterior surface and the second exterior surface includes at least one
3 material having an adhesive activation temperature and wherein the first
4 exterior surface and the second exterior surface are joined to one another
5 while at least one of the first exterior surface and the second exterior

6 surface is at a temperature no less than the adhesion activation
7 temperature and less than the extrusion temperature.

1 5. The method of claim 4, wherein the extrusion temperature is
2 greater than 350 degrees Fahrenheit.

1 6. The method of claim 4, wherein the adhesion activation
2 temperature is approximately 270 degrees Fahrenheit.

1 7. The method of claim 1, wherein the first exterior surface of
2 the structural sheet is less than the extrusion temperature and the first
3 exterior surface is joined to the second exterior surface.

1 8. The method of claim 1, wherein the first exterior surface of
2 the structural sheet is at a temperature less than a melting point of the at
3 least one polymeric material when the first exterior surface is being joined
4 to the second exterior surface.

1 9. The method of claim 8, wherein the first exterior surface of
2 the structural sheet is less than approximately 266 degrees Fahrenheit
3 when the first exterior surface is being joined to the second exterior
4 surface.

1 10. The method of claim 1, wherein the first exterior surface of
2 the structural sheet is at a temperature less than approximately 190
3 degrees Fahrenheit when the first exterior surface is joined to the second
4 exterior surface.

1 11. The method of claim 1, wherein the bonding layer includes a
2 covalent adhesive.

1 12. The method of claim 11, wherein the bonding layer includes
2 an olefinic material.

1 13. The method of claim 1, wherein materials of the first exterior
2 surface and the second exterior surface are cross linked when being
3 joined to one another.

1 14. The method of claim 1, wherein at least one of the first
2 exterior surface and the second exterior surface includes a reactive cross-
3 link adhesive with polyolefin.

1 15. The method of claim 1, wherein the first exterior surface
2 includes a reactive cross-link adhesive with polyolefin.

1 16. The method of claim 1, wherein the bonding layer has a
2 thickness of less than about 0.2 mils.

1 17. The method of claim 1, wherein the at least one paint layer
2 and the bonding layer are part of a laminate having a thickness of less
3 than about 2 mils and wherein the thermoformable sheet consists solely
4 of the structural sheet and the laminate.

1 18. The method of claim 1, wherein the mold is configured to
2 deform the thermoformable sheet into a canoe hull.

1 19. The method of claim 1, wherein the structural sheet includes
2 polyethylene.

1 20. The method of claim 19, wherein the structural sheet is
2 composed substantially entirely of polyethylene.

3 21. The method of claim 1, including providing a PVDF layer
4 coupled to the at least one paint layer.

1 22. The method of claim 1, wherein the at least one paint layer
2 includes a backing color and at least one additional color distinct from the
3 backing color.

1 23. The method of claim 22, wherein the at least one additional
2 distinct color is provided in a plurality of shapes.

1 24. The method of claim 22, wherein the plurality of shapes are
2 distinct from one another.

1 25. The method of claim 22, wherein the plurality of shapes are
2 in the shape of environmental vegetation.

1 26. The method of claim 1, wherein the first exterior surface is
2 at a temperature less than 350 degrees Fahrenheit when joined to the
3 second exterior surface.

1 27. A method for forming a thermoformable panel, the method
2 comprising:

3 providing at least one paint layer and a bonding layer coupled
4 to the at least one paint layer and including a first exterior surface;

5 providing a structural sheet of at least one polymeric
6 material, the sheet having a thickness of at least 0.25 inches and
7 including a second exterior surface; and

8 joining the first exterior surface to the second exterior
9 surface to form a thermoformable panel.

1 28. The method of claim 27, wherein the first exterior surface
2 and the second exterior surface are joined to one another after the
3 structural sheet has undergone at least 40 percent shrinkage from its
4 extruded dimension while cooling from the extrusion temperature.

1 29. The method of claim 28, wherein the thermoformable sheet
2 is joined to the laminate after the sheet has shrunk at least 90 percent
3 from its extruded dimensions.

1 30. The method of claim 27, wherein the bonding layer includes
2 a covalent adhesive.

1 31. The method of claim 27, wherein the bonding layer has a
2 thickness of less than about 0.2 mils.

1 32. The method of claim 27, wherein the step of providing a
2 structural sheet comprises extruding a structural sheet of at least one
3 polymeric material.

1 33. A three-dimensional polymeric structure comprising:
2 at least one wall including:
3 a structural polymeric layer having a thickness of at
4 least 0.25 inches; and
5 a laminate including:
6 at least one paint layer;
7 at least one translucent layer overlying a first
8 side of the at least one paint layer; and
9 a bonding layer adjacent and coupled directly to
10 the structural layer and coupled to a second side of the at least one paint
11 layer, the bonding layer having a thickness of less than about 0.2 mils.

1 34. The structure of claim 32, wherein adjacent surfaces of the
2 structural polymeric layer and the bonding layer are joined by cross
3 linking.

1 35. The structure of claim 32, wherein the bonding layer includes
2 a covalent adhesive.

1 36. The structure of claim 34, wherein the bonding layer includes
2 an olefinic material.

1 37. The structure of claim 32, wherein the bonding layer includes
2 a reactive cross-link adhesive with polyolefin.

1 38. The structure of claim 32, wherein the at least one paint
2 layer, the at least one translucent layer and the bonding layer are part of a
3 laminate having a thickness of less than about 2 mils and wherein at least
4 one wall consists solely of structural layer and the laminate.

1 39. The structure of claim 32, wherein the structural layer
2 includes polyethylene.

1 40. The structure of claim 38, wherein the structural sheet is
2 composed substantially entirely of polyethylene.

1 41. The structure of claim 32, wherein the at least one
2 translucent layer includes a PVDF layer.

1 42. The structure of claim 32, wherein the at least one paint
2 layer includes a backing color and at least one additional color distinct
3 from the backing color.

1 43. The structure of claim 42, wherein the at least one additional
2 distinct colors provided in the plurality of shapes.

1 44. The structure of claim 42, wherein the plurality of shapes are
2 distinct from one another.

1 45. The structure of claim 41, wherein the plurality of shapes are
2 in the shape of environmental vegetation.

1 46. The structure of claim 32, wherein the structure comprises a
2 watercraft.

1 47. A three dimensional polymeric structure comprising:
2 at least one wall including:
3 a structural polymeric layer having a thickness of at
4 least 0.25 inches; and
5 a laminate including:
6 at least one paint layer;
7 at least one translucent layer overlying a first
8 side of the at least one paint layer; and
9 a bonding layer coupled to a second side of the
10 at least one paint layer, wherein the bonding layer and the structural layer
11 are joined to one another by cross linking.